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NOTICE OF ALLOWANCE AND FEE(S) DUE

27572 7590 12/29/2009

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER	
LIU, LI	
ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 12/29/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,710	08/11/2006	Kazushige Yonenaga	5259-000060/US/NP	9721

TITLE OF INVENTION: OPTICAL TRANSMISSION SYSTEM, OPTICAL TRANSMITTER FOR OPTICAL TRANSMISSION SYSTEM, AND OPTICAL RECEIVER FOR OPTICAL TRANSMISSION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	03/29/2010

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27572 7590 12/29/2009

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Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,710	08/11/2006	Kazushige Yonenaga	5259-000060/US/NP	9721

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APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	03/29/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
LIU, LI	2613	398-208000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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EXAMINER	
LIU, LI	
ART UNIT	PAPER NUMBER
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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 514 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 514 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	10/555,710	YONENAGA ET AL.	
	Examiner	Art Unit	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *9/18/2009*.

2. ☒ The allowed claim(s) is/are *20-22,42 and 43; renumbered as 1-5*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 10/12/2009
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Li Liu/ Examiner, Art Unit 2613	

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 10/12/2009 is being considered by the examiner.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Gregory A. Stobbs on December 16, 2009.

3. The application has been amended as follows:

IN THE CLAIMS:

- Claims 2-19, 24 and 26-41 have been cancelled.
- Claims 20, 21, 42 and 43 are amended as follows:

20. (currently amended) An optical transmission system comprising:

an optical transmitter which outputs differential-encoded phase-modulated light;

and an optical receiver which detects the phase-modulated light and performs demodulation,

wherein the optical transmitter comprises: an encoder which converts NRZ code input signals into NRZ-I code signals; and a phase modulator which, for marks and

spaces encoded by the encoder, outputs phase-modulated light with a phase deviation $\Delta\phi$ imparted over a range $0 \leq \Delta\phi \leq \pi$,

the optical receiver comprises:

a Mach-Zehnder interferometer with two independent phase adjustment terminals to set a phase difference between two interfering signals, which splits the phase-modulated light which has been received into two signal light beams, delays one of the split signal light beams by one bit, and causes the two signal light beams to interfere to effect conversion into intensity-modulated light;

a balanced detection circuit which performs photoelectric conversion of signal light from two output ports of the Mach-Zehnder interferometer, and outputs a difference in converted electrical signals;

a low-frequency signal generation circuit which applies a first low-frequency signal at frequency f1 to one of the two phase adjustment terminals of the Mach-Zehnder interferometer;

an infinitesimal-modulated signal component detection circuit which detects a second low-frequency signal from a signal supplied by the balanced detection circuit;

a synchronous detection circuit which, by synchronous detection of the second low-frequency signal output from the infinitesimal-modulated signal component detection circuit using the first low-frequency signal output from the low-frequency signal generation circuit, detects a shift amount and direction of shift between a center wavelength of the phase-modulated light output from the optical transmitter and a pass band wavelength of the Mach-Zehnder interferometer;

a control circuit which outputs a feedback error signal as a control signal to adjust the phase difference between the two split signal light beams so as to correct the shift amount; and

an offset setting circuit which accepts an output from the synchronous detection circuit and provides a signal to the control circuit; and

a driver circuit which applies the feedback error signal to the other of the two phase adjustment terminals.

21. (currently amended) An optical transmission system comprising:

an optical transmitter which outputs differential-encoded phase-modulated light; and

an optical receiver which detects the phase-modulated light and performs demodulation,

wherein the optical transmitter comprises: an encoder which converts NRZ code input signals into NRZ-I code signals; and a phase modulator which, for marks and spaces encoded by the encoder, outputs phase-modulated light with a phase deviation $\Delta\phi$ imparted over a range $0 \leq \Delta\phi \leq \pi$,

the optical receiver comprises:

a Mach-Zehnder interferometer with phase adjustment terminal to set a phase difference between two interfering signals, which splits the phase-modulated light which has been received into two signal light beams, delays one of the split signal light beams by one bit, and causes the two signal light beams to interfere to effect conversion into intensity-modulated light;

a balanced detection circuit which performs photoelectric conversion of signal light from two output ports of the Mach-Zehnder interferometer, and outputs a difference in converted electrical signals;

a low-frequency signal generation circuit which applies a first low-frequency signal at frequency f1 to the phase adjustment terminal of the Mach-Zehnder interferometer;

an infinitesimal-modulated signal component detection circuit which detects a second low-frequency signal from a signal supplied by the balanced detection circuit;

a synchronous detection circuit which, by synchronous detection of the second low-frequency signal output from the infinitesimal-modulated signal component detection circuit using the first low-frequency signal output from the low-frequency signal generation circuit, detects a shift amount and direction of shift between a center wavelength of the phase-modulated light output from the optical transmitter and a pass band wavelength of the Mach-Zehnder interferometer;

a control circuit which outputs a control signal to adjust the phase difference between the two split signal light beams so as to correct the shift amount;

a driver circuit which drives the phase adjustment terminal based on the control signal; and

an optical carrier frequency detection unit which detects, from received signal light detected by the balanced detection circuit, a relative position between an optical carrier frequency and an optical frequency characteristic of the Mach-Zehnder interferometer based on the frequencies corresponding to minima in the optical

spectrum which are found by scanning the received signal light; and ~~an offset setting circuit which provides an offset to a feedback error signal in the control circuit,~~

an offset setting circuit which accepts outputs from the synchronous detection circuit and the optical carrier frequency detection unit, and provides an offset to a feedback error signal in the control circuit,

a value of the offset of the offset setting circuit is adjusted such that the position of the optical carrier frequency matches a peak position or bottom position of the optical frequency characteristic of the Mach-Zehnder interferometer.

42. (currently amended) An optical receiver, in an optical transmission system comprising: an optical transmitter which outputs differential-encoded, phase-modulated light; and the optical receiver which detects the phase-modulated light and performs demodulation, wherein the optical transmitter comprises: an encoder which converts NRZ code input signals into NRZ-I code signals; and a phase modulator which, for marks and spaces encoded by the encoder, outputs phase-modulated light with a phase deviation $\Delta\phi$ imparted over the range $0 \leq \Delta\phi \leq \pi$,

the optical receiver comprising:

a Mach-Zehnder interferometer with two independent phase adjustment terminals to set a phase difference between two interfering signals, which splits the phase-modulated light which has been received into two signal light beams, delays one of the split signal light beams by one bit, and causes the two signal light beams to interfere to effect conversion into intensity-modulated light;

a balanced detection circuit which performs photoelectric conversion of signal light from two output ports of the Mach-Zehnder interferometer, and outputs a difference in converted electrical signals;

a low-frequency signal generation circuit which applies a first low-frequency signal at frequency f1 to one of the two phase adjustment terminals of the Mach-Zehnder interferometer;

an infinitesimal-modulated signal component detection circuit which detects a second low-frequency signal from a signal supplied by the balanced detection circuit;

a synchronous detection circuit which detects a shift amount and direction of shift between a center wavelength of the phase-modulated light output from the optical transmitter and a pass band wavelength of the Mach-Zehnder interferometer, through synchronous detection of the second low-frequency signal output from the infinitesimal-modulated signal component detection circuit using the first low-frequency signal output from the low-frequency signal generation circuit;

a control circuit which outputs a feedback error signal as a control signal to adjust the phase difference between the two split signal light beams so as to correct the shift amount; and

an offset setting circuit which accepts an output from the synchronous detection circuit and provides a signal to the control circuit; and

a driver circuit which applies the feedback error signal to the other of the two phase adjustment terminals.

43. (currently amended) An optical receiver, in an optical transmission system comprising: an optical transmitter which outputs differential-encoded, phase-modulated light; and the optical receiver which detects the phase-modulated light and performs demodulation, wherein the optical transmitter comprises: an encoder which converts NRZ code input signals into NRZ-I code signals; and a phase modulator which, for marks and spaces encoded by the encoder, outputs phase-modulated light with a phase deviation $\Delta\phi$ imparted over the range $0 \leq \Delta\phi \leq \pi$,

the optical receiver comprising:

a Mach-Zehnder interferometer with phase adjustment terminal to set a phase difference between two interfering signals, which splits the phase-modulated light which has been received into two signal light beams, delays one of the split signal light beams by one bit, and causes the two signal light beams to interfere to effect conversion into intensity-modulated light;

a balanced detection circuit which performs photoelectric conversion of signal light from two output ports of the Mach-Zehnder interferometer, and outputs a difference in converted electrical signals;

a low-frequency signal generation circuit which applies a first low-frequency signal at frequency f1 to the phase adjustment terminal of the Mach-Zehnder interferometer;

an infinitesimal-modulated signal component detection circuit which detects a second low-frequency signal from a signal supplied by the balanced detection circuit;

a synchronous detection circuit which detects a shift amount and direction of shift between a center wavelength of the phase-modulated light output from the optical transmitter and a pass band wavelength of the Mach-Zehnder interferometer, through synchronous detection of the second low-frequency signal output from the infinitesimal-modulated signal component detection circuit using the first low-frequency signal output from the low-frequency signal generation circuit;

a control circuit which outputs a control signal to adjust the phase difference between the two split signal light beams so as to correct the shift amount;

a driver circuit which drives the phase adjustment terminal based on the control signal; and

an optical carrier frequency detection unit which detects, from received signal light detected by the balanced detection circuit, a relative position between an optical carrier frequency and an optical frequency characteristic of the Mach-Zehnder interferometer based on the frequencies corresponding to minima in the optical spectrum which are found by scanning the received signal light; and ~~an offset setting circuit which provides an offset to a feedback error signal in the control circuit,~~

an offset setting circuit which accepts outputs from the synchronous detection circuit and the optical carrier frequency detection unit, and provides an offset to a feedback error signal in the control circuit,

wherein a value of the offset of the offset setting circuit is adjusted such that the position of the optical carrier frequency matches a peak position or bottom position of the optical frequency characteristic of the Mach-Zehnder interferometer.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Li Liu/
Examiner, Art Unit 2613
December 16, 2009